

Claims 1 - 6 are in the application. All the claims have been finally rejected under 35 U.S.C. §103(a) as unpatentable over Yamamoto in view of Shea and Callis, with which Lucas is combined in the rejection of claim 3.

In discussing applicants' previous response, the final Office Action commented that "one cannot show unobviousness by attacking references individually where the rejections are based on combinations of references". However, when individual references do not show what an Examiner purports that they show, comments on the individual references seem entirely appropriate.

The Examiner has stated that Yamamoto teaches a process which uses at least an oxide of calcium in combination with silicates and is cured. Shea provides teaching that oxides of calcium, barium and strontium are used interchangeably and therefore constitute art-recognized functional equivalents which provide the same effect. The Examiner went on to say that one of ordinary skill would have found it *prima facie* obvious to substitute Yamamoto's calcium oxide with barium oxide or strontium oxide in view of their art-recognized equivalency. This is discussed further below, but comments will first be provided on the combination of references. It must first of all be kept in mind that the present invention requires the presence of both calcium oxide and one of barium oxide and strontium oxide, i.e. it requires the presence of two oxide components, not just one. The mere substitution of the calcium oxide of Yamamoto with barium oxide or strontium oxide would give a one-oxide-component product, which is not what is being claimed. Secondly, if the oxides of calcium, barium and strontium are art-recognized equivalents, as stated by the Examiner, what would be the motivation in combining an oxide of barium or strontium with calcium? Without prior knowledge of the present invention, i.e. of

the protective effect of oxides of barium and strontium on refractories containing calcium oxide (and silicate), there would be no motivation to use a combination of oxides - surely one would be as good as another and logic would imply the sole use of the least expensive or most readily-available, as disclosed by Yamamoto. There would be no motivation to source two materials instead of one.

Thirdly, if oxides of calcium, barium and strontium are art-recognized equivalents, the finding by the inventors of the present invention of the protective effect (against attack by molten metals in an unfired product) is surely unexpected. Equivalents are supposed to have equivalent properties (otherwise they would not be equivalents), so a mixture of two equivalents would be expected to have the same behavior as each one used singly. The present invention is therefore surprising and unexpected.

The Examiner quoted Callis as suggesting the use of a mixture of the alkaline earth oxides as well as the individual oxides themselves, but the very passage quoted by the Examiner lists the alkaline earth oxides or mixtures that are effective in "my process", it is not a statement that the oxides are equivalent for *all* processes. The process of Callis is so fundamentally different from that of the present invention (there is no silicate), that a person skilled in the art would not consider it relevant to the present invention. There should be no combination of references that are not logical to combine.

As noted above, it is believed that the present invention is unobvious even if oxides of calcium, strontium and barium are art-recognized equivalents, but Applicant does not agree that these oxides are art-recognized as equivalent *for all purposes*. It is rather like saying that methanol and ethanol are equivalent fuels,

but not too many sane people drink methanol, whereas lots of people drink ethanol. They may be equivalent fuels, but they are not equivalent beverages. There are very few different materials that are equivalent for all purposes, otherwise they would be identical. This is why the Applicant discussed individual references in the prior response. The Examiner was using these references to show the equivalency of oxides of calcium, barium and strontium, but in contexts quite different from those of the present invention - contexts that would not tempt a person skilled in the art to make the suggested substitutions in the context of the present invention. The Examiner has not established equivalency of oxides of calcium, barium and strontium in refractories that are chemically attacked when exposed to molten metals.

In Shea, the equivalency was for "better weathering characteristics and strength". In the present invention, there is no need for better weathering characteristics and strength, so no motivation for a person skilled in the art to use these materials interchangeably. Shea does not even provide a hydrothermal step, and so the equivalency after providing such a step is not apparent. In Callis, the equivalency is for reaction with alkali metal aluminates to form a binder for a filler material. Again, this is not relevant to the present invention and would not be seen as such to a person skilled in the art.

In summary, it is believed that the Examiner has not established the art-recognized equivalency of oxides of calcium, barium and strontium *for use in refractories subject to chemical attack by molten metal*. But even if the Examiner had established such an equivalency, there would be no motivation to mix oxides of calcium and barium or calcium and strontium rather than make a direct substitution of one oxide for another. There is nothing in

the prior art to suggest the protective function of these materials against chemical attack of a calcium oxide-containing material.

The enclosed copy of a Declaration under 37 C.F.R. §1.132 by one of the joint applicants sets forth test results showing the effectiveness of a strontium-containing compound, as well as a barium-containing compound, in protecting a calcium silicate refractory against metal attachment (compare Example 2 of applicants' specification, which sets forth somewhat similar tests using barium-containing compounds). These additional test results support the conclusion that the combination of either a barium-containing compound or a strontium-containing compound with a calcium silicate-containing refractory material provide unexpected beneficial results that are entitled to weight in determining the patentability of method claim 1 (on which claims 2 - 6 are dependent) over Yamamoto, Shea and Callis and any proper combination thereof.

For the foregoing reasons, it is believed that this application is now in condition for allowance. Favorable action thereon is accordingly courteously requested.

Respectfully,

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I hereby certify that this paper is being deposited this date with the U.S. Postal Service as first class mail addressed to Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.

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